

## **CLAIM AMENDMENTS**

This listing of Claims will replace all prior versions, and listings of claims in the application:

1. (Currently Amended) An H-bridge driver for driving an electrical load; said H-bridge driver comprising first and second high side MOSFETs and first and second low side MOSFETs; each of said MOSFETs having respective drain, source and control electrodes; the drain electrodes of said high side MOSFETs and the source electrodes of said low side MOSFETs connected to power input terminals; the source electrodes of said first and second high side MOSFETs connected to the drain electrodes of said first and second low side MOSFETs ~~electrodes~~ respectively at first and second nodes which define output bridge terminals; a control IC for controlling the operation of said high side and low side MOSFETs; said control IC having input terminals connectable to receive input control signals from an exterior bridge control circuit and having output terminals connected to said control electrodes of said high side MOSFETs; a support for supporting said first and second high side MOSFETs and said control IC; and a common insulation housing enclosing said first and second high side MOSFETs and said IC; ~~and connection pins extending from said housing~~; said first and second high side MOSFETs comprising intelligent power switches having ~~and have~~ output terminals ~~communicating~~ signals related to at least one of a ~~the~~ switch current and to a ~~the~~ MOSFET die temperature; said output terminals of at least one of intelligent power switch communicating ~~coupled to said IC producing~~ an output signal for ~~to~~ said at least said control IC ~~to microcontroller for shut down~~ ~~of~~ said H-bridge when one of the switch ~~either~~ current and the MOSFET ~~or~~ die temperature exceed a given threshold value.

2. (Currently Amended) An H-bridge driver for driving an electrical load; said H-bridge driver comprising first and second high side MOSFETs and first and second low side MOSFETs; each of said MOSFETs having respective drain, source and control electrodes; the drain electrodes of said high side MOSFETs and the source electrodes of said low side MOSFETs connected to power input terminals; the source electrodes of said first and second high side

MOSFETs connected to the drain electrodes of said first and second low side MOSFETs ~~electrodes~~ respectively at first and second nodes which define output bridge terminals; a control IC for controlling the operation of said high side and low side MOSFETs; said control IC having input terminals connectable to receive input control signals from an exterior bridge control circuit and having output terminals connected to said control electrodes of said high side MOSFETs; a support for supporting said first and second high side MOSFETs and said control IC; and a common insulation housing enclosing said first and second high side MOSFETs and said control IC; and connection pins extending from said housing; said connection pins including IN1 and IN2 pins coupled to the respective control electrodes of of ~~[[o]]~~ said first and second high side MOSFETs, a  $V_{cc}$  pin and a GND pin connected to said power input terminals, and M1 and M2 pins connected to said first and second nodes respectively.

3. (Currently Amended) An H-bridge driver for driving an electrical load; said H-bridge driver comprising first and second high side MOSFETs and first and second low side MOSFETs; each of said MOSFETs having respective drain, source and control electrodes; the drain electrodes of said high side MOSFETs and the source electrodes of said low side MOSFETs connected to power input terminals; the source electrodes of said first and second high side MOSFETs connected to the drain electrodes of said first and second low side MOSFETs ~~electrodes~~ respectively at first and second nodes which define output bridge terminals; a control IC for controlling the operation of said high side and low side MOSFETs; said control IC having input terminals connectable to receive input control signals from an exterior bridge control circuit and having output terminals connected to said control electrodes of said high side MOSFETs; a support for supporting said first and second high side MOSFETs and said control IC; and a common insulation housing enclosing said first and second high side MOSFETs and said control IC; ~~and connection pins extending from said housing~~; said low side MOSFETs both being normally ON.

4. (Currently Amended) The device of claim 3, which further includes a shoot-thru prevention circuit in said control IC for turning on said first or second low side device in

response to the turn off of said first or second high side MOSFET respectively, and when said first or second high side MOSFET output reaches a given low voltage value compared to its full output voltage.

5. (Currently Amended) An H-bridge driver for driving an electrical load; said H-bridge driver comprising first and second high side MOSFETs and first and second low side MOSFETs; each of said MOSFETs having respective drain, source and control electrodes; the drain electrodes of said high side MOSFETs and the source electrodes of said low side MOSFETs connected to power input terminals; the source electrodes of said first and second high side MOSFETs connected to the drain electrodes of said first and second low side MOSFETs ~~electrodes~~ respectively at first and second nodes which define output bridge terminals; a control IC for controlling the operation of said high side and low side MOSFETs; said control IC having input terminals connectable to receive input control signals from an exterior bridge control circuit and having output terminals connected to said control electrodes of said high side MOSFETs; a support for supporting said first and second high side MOSFETs and said control IC; and a common insulation housing enclosing said first and second high side MOSFETs and said control IC; ~~and connection pins extending from said housing~~; said IC including a PWM generator for applying a soft start PWM signal to said control electrodes of said low side MOSFETs.

6. (Original) The device of claim 5, wherein said low side MOSFETs are normally ON.

7. (Currently Amended) The device of claim 6, which further includes a shoot-thru prevention circuit in said control IC for turning on said first or second low side device in response to the turn off of said first or second high side MOSFET respectively, when said first or second high side MOSFET output reaches a given low voltage value compared to its full output voltage.

8. (Currently Amended) The H-bridge driver of claim 7, wherein said first and second high side MOSFETs are intelligent power switches and have output terminals with signals related to a [[the]] switch current and to a [[the]] MOSFET die temperature; said output terminals coupled to said control IC producing an output signal to said control IC microcontroller for shut down of said H-bridge when either current or die temperature exceed a given value.

9. (Currently Amended) The H-bridge driver of claim 8, wherein said first and second high side MOSFETs are intelligent power switches and have output terminals with signals related to the switch current and to the MOSFET die temperature; said output terminals coupled to said control IC producing an output signal to said microcontroller for shut down of said H-bridge when either current or die temperature exceed a given value; said connection pins including a DG pin connected to said output signal produced by said control IC responsive to excessive die temperature or current.

10. (Original) The device of claim 2, wherein said low side MOSFETs are normally ON.

11. (Currently Amended) The device of claim 10, which further includes a shoot-thru prevention circuit in said control IC for turning on said first or second low side in response to the turn off of said first or second high side MOSFET respectively, when said first or second high side MOSFET output reaches a given low voltage value compared to its full output voltage.

12. (Currently Amended) The device of claim 2, wherein said control IC includes a PWM generator for applying a soft start PWM signal to said control electrodes of said low side MOSFETs.

13. (Original) The device of claim 5, wherein said low side MOSFETs are normally ON.

14. (Currently Amended) The H-bridge driver of claim 5, which further includes an external RC circuit connected to said control IC for controlling the duty cycle of said soft start circuit; said RC circuit including a resistor and capacitor.

15. (Currently Amended) The H-bridge driver of claim 6, which further includes an external RC circuit connected to said control IC for controlling the duty cycle of said soft start circuit.

16. (Original) The H-bridge driver of claim 14, wherein said connection pins include a  $V_{RC}$  pin connected to one end of the resistor of said RC circuit, an SS pin connected to the node between the resistor and capacitor of said RC circuit and a GND pin connected to one end of the capacitor of said RC circuit.

17. (Original) The H-bridge driver of claim 14, wherein said connection pins include IN1 and IN2 pins coupled to the respective control electrodes of said first and second high side MOSFETs, a  $V_{cc}$  pin and a GND pin connected to said power input terminals, and an M1 and M2 pins connected to said first and second nodes respectively.

18. (Original) The H-bridge driver of claim 17, wherein said connection pins include a  $V_{RC}$  pin connected to one end of the resistor of said RC circuit, an SS pin connected to the node between the resistor and capacitor of said RC circuit and a GND pin connected to one end of the capacitor of said RC circuit.

## **REMARKS**

Applicants have amended the specification to correct a typographical error. Applicants have not amended the drawings and submits that they comply with USPTO practice. Applicants have amended claims 1-5, 7-9, 11, 12, 14, 15 to overcome the examiner's rejections under 35 U.S.C. § 112 and to fix several typographical errors. Applicants have not amended claims 6, 10, 13, 16-18 since there was no independent basis for rejecting these claims, and as Applicants have amended the claims upon which they depend. Accordingly claims 1-18 are currently pending in the present application.

It is respectfully submitted that claims 1-18 are now allowable. Otherwise, Applicants respectfully traverse all objections and claim rejections for the reasons that follow:

### **I. DRAWINGS**

The examiner objected to the drawings for failing to comply with 37 CFR 1.84(p)(5) because they "include the following reference sign(s) not mentioned in the description: 105 in Fig. 10." Office Action p2. Applicants respectfully submit that the described reference is included on p13 of the Application in [0062]. ("Capacitor 91 is discharged through **resistor 105 (50Ω)** when the H-bridge conduction stops.") Accordingly, Applicants request that the objection to the drawings be withdrawn.

### **II. CLAIM OBJECTION OF CLAIM 2**

Claim 2 was objected to because of a typographical error. Applicants have amended the claim to overcome this objection. Accordingly, it is kindly requested that this objection be withdrawn.

### **III. CLAIM REJECTIONS OF CLAIMS 1-18 - 35 U.S.C. § 112**

In paragraph 5 of the Office Action, the examiner rejected claims 1-3 and 5 under 35 U.S.C. § 112 for having a vague and indefinite phrase - "connection pins." Applicants have amended claims 1, 3, and 5 without prejudice to address the concerns of the Office Action. It is respectfully submitted that the amendments do not add new matter but rather put these claims in

allowable condition. Accordingly, it is kindly requested that the rejection of claims 1, 3 and 5 under 35 U.S.C. § 112, second paragraph, be withdrawn.

With respect to claim 2, Applicant traverses and asserts that “connection pins” are fully defined. The test for definiteness under 35 U.S.C. 112, second paragraph is whether “those skilled in the art would understand what is claimed when the claim is read in light of the specification.” Orthokinetics, Inc. v. Safety Travel Chairs, Inc., 806 F.2d 1565, 1576 (Fed. Cir. 1986). M.P.E.P. 2173.02 (2003). Further, an applicant is free under 35 U.S.C. 112 to “set the metes and bounds of ‘his invention’ as he sees them, . . .” In re Wolfrum and Gold, 179 U.S.P.Q. (BNA) 620 (C.C.P.A. 1973). The Office Action asserts on p2-3, that “it is not clear where the connection pins are located relative to the other elements in the claim. Furthermore, it is not clear from the claim what the connection pins are connected to.” Applicants contend that “connection pins extending from said housing; said connection pins including IN1 and IN2 pins coupled to the respective control electrodes of said first and second high side MOSFETs, a  $V_{cc}$  pin and a GND pin connected to said power input terminals, and M1 and M2 pins connected to said first and second nodes respectively,” as in claim 2 is definite and addresses the concerns of the Office Action. Accordingly, it is kindly requested that the rejection of claim 2 under 35 U.S.C. § 112, second paragraph, be withdrawn.

In paragraph 6 of the Office Action, the examiner rejected claim 1 under 35 U.S.C. § 112 for having a vague and indefinite phrase - “intelligent power switch.” Applicant has amended claim 1 herein without prejudice to address the concerns of the Office Action and to clarify the subject matter which Applicant regards as his invention. Accordingly, it is kindly requested that the rejection of claim 1 under 35 U.S.C. § 112, second paragraph, be withdrawn.

In paragraph 7 of the Office Action, the examiner rejected claims 1 and 8 under 35 U.S.C. § 112 for having insufficient antecedent basis for “the switch current.” Applicant has amended claims 1 and 8 herein without prejudice to address the concerns of the Office Action. It is respectfully submitted that the amendments do not add new matter and put these claims in allowable condition. Accordingly, it is kindly requested that the rejection of claims 1 and 8 under 35 U.S.C. § 112, second paragraph, be withdrawn.

In paragraph 8 of the Office Action, the examiner rejected claims 1 and 8 under 35 U.S.C. § 112 for having insufficient antecedent basis for “the MOSFET die temperature.” Applicant has amended claims 1 and 8 herein without prejudice to address the concerns of the Office Action. It is respectfully submitted that the amendments do not add new matter and put these claims in allowable condition. Accordingly, it is kindly requested that the rejection of claims 1 and 8 under 35 U.S.C. § 112, second paragraph, be withdrawn.

In paragraph 9 of the Office Action, the examiner rejected claims 1 and 8 under 35 U.S.C. § 112 for having insufficient antecedent basis for “said microcontroller.” Applicant has amended claims 1 and 8 herein without prejudice to address the concerns of the Office Action. It is respectfully submitted that the amendments do not add new matter and put these claims in allowable condition. Accordingly, it is kindly requested that the rejection of claims 1 and 8 under 35 U.S.C. § 112, second paragraph, be withdrawn.

In paragraph 10 of the Office Action, the examiner rejected claim 1 under 35 U.S.C. § 112 for having a vague and indefinite phrase - “either current or die temperature.” Applicant has amended claim 1 herein without prejudice to address the concerns of the Office Action. It is respectfully submitted that the amendments do not add new matter and put these claims in allowable condition. Accordingly, it is kindly requested that the rejection of claim 1 under 35 U.S.C. § 112, second paragraph, be withdrawn.

In paragraph 11 of the Office Action, the examiner rejected claim 1 under 35 U.S.C. § 112 for having a vague and indefinite phrase - “a given value.” Applicant has amended claim 1 herein without prejudice to address the concerns of the Office Action. It is respectfully submitted that the amendments do not add new matter and put these claims in allowable condition. Accordingly, it is kindly requested that the rejection of claim 1 under 35 U.S.C. § 112, second paragraph, be withdrawn.

In paragraph 12 of the Office Action, the examiner rejected claim 2 under 35 U.S.C. § 112 for having insufficient antecedent basis for “said power input terminals.” Respectfully, Applicant traverses. Applicant points to Claim 2, line 5 as the antecedent basis. (“the drain electrodes of said high side MOSFETs and the source electrodes of said low side MOSFETs



connected to power input terminals.”) Accordingly, it is kindly requested that the rejection of claim 2 under 35 U.S.C. § 112, second paragraph, be withdrawn.

In paragraph 13 of the Office Action, the examiner rejected claims 16 and 18 under 35 U.S.C. § 112 for having insufficient antecedent basis for “the resistor.” Applicant has amended claims 14 herein without prejudice to address the concerns of the Office Action. It is respectfully submitted that the amendments do not add new matter and put these claims in allowable condition. Accordingly, it is kindly requested that the rejection of claims 16 and 18 under 35 U.S.C. § 112, second paragraph, be withdrawn.

Additionally, Applicant has fixed several typographical errors. In claim 1, line 8, Applicant has changed “electrodes” to “MOSFETs.” In Claims 1-5, 7-9, 11, 12, 14, and 15, Applicant has changed “IC” to “control IC.” These amendments are clerical and do not add any new matter to the claim.

Accordingly, it is kindly requested that the rejection of claims 1-18 under 35 U.S.C. § 112, second paragraph, be withdrawn.

## **VII. CONCLUSION**

In view of the foregoing, it is respectfully submitted that all pending claims are currently in allowable condition. Accordingly, reconsideration and prompt allowance of all pending claims is earnestly solicited.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on August 6, 2003:

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